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ROCKS and MINERALS

A Magazine for Mineralogist, Geologist and Collector . . .

. . . . . *Official Journal of The Rocks and Minerals Association*

November, 1938

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THE ROCKS AND MINERALS ASSOCIATION

PEEKSKILL, N. Y.

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Organized in 1928 for the increase and dissemination of mineralogic knowledge.

To stimulate public interest in geology and mineralogy and to endeavor to have courses in these subjects introduced in the curricula of the public school systems; to revive a general interest in minerals and mineral collecting; to instruct beginners as to how a collection can be made and cared for; to keep an accurate and permanent record of all mineral localities and minerals found there and to print same for distribution; to encourage the search for new minerals that have not yet been discovered; and to endeavor to secure the practical conservation of mineral localities and unusual rock formations.

Ever since its foundation in 1928, the Rocks and Minerals Association has done much to promote the interest in mineralogy. It has sponsored outings, expeditions, formations of mineralogical clubs and the printing of many articles that have been a distinct contribution to mineralogy.

Those of our readers who are members of the Association can rightly feel that they too were sponsors of these many achievements that have helped to give mineralogy a national recognition. Among your friends there must be many who would like to have a part in the Association's work—to share with you the personal satisfaction, the pleasure, and the benefits of membership. Will you give your friends this opportunity to join the Association by nominating them for membership?

Each new member helps to extend the Association's activities—helps to make your magazine larger,better, and more interesting, and above all assists in the dissemination of mineralogical knowledge.

Some advantages of membership: All members in good standing receive:

(1) **Rocks and Minerals**, a monthly magazine. (2) A member's identification card that secures the privileges of many mines, quarries, clubs, societies, museums, libraries. (3) The right to participate in outings and meetings arranged by the Association. (4) The right to display a certificate of membership and to place after their names a designation indicating their membership or to advertise membership on stationery, etc. (5) The distinction and the endorsement which comes from membership in the world's largest mineralogical society.

Mineralogical clubs which subscribe for **Rocks and Minerals** also become affiliated members of the Rocks and Mineral Association and enjoy all the advantages which such an affiliation affords.

A number of clubs hold membership in the Association, participate in the annual outings, and co-operate in many ways in furthering the aims and ambitions of the Association.

Affiliation with the world's largest mineralogical society cannot fail to increase membership, enlarge circles of acquaintanceship, and stimulate a keener interest in mineralogy.

A list of affiliated clubs will be found among the back pages of the magazine.

ROCKS and MINERALS

PUBLISHED MONTHLY

Edited and Published by
PETER ZODAC

NOVEMBER
1938

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ROCKS and MINERALS PEEKSKILL, N. Y., U. S. A.

The Official Journal of the Rocks and Minerals Association

CHIPS FROM THE QUARRY

PETER ZODAC

THE EDITOR ASKS A FAVOR

Rocks and Minerals has frequently been petitioned for assistance in planning trips, for information covering localities available along certain routes, or for notes on interesting localities in various states. From the many letters sent us covering these various subjects it is only too evident that thousands of localities are being visited yearly and that interest in mineralogy is increasing tremendously.

Among some of the many questions submitted are: "I shall make a trip from New York to Denver. What interesting localities are available enroute and how can I reach them?" "I shall spend three weeks in South Carolina. Please tell me of some good localities in that state?" "I shall tour eastern Canada. Can you plan a course for me so as to cover some interesting localities?"

In order that we may be of more assistance to our large number of collectors, we desire the cooperation of all readers. Will each and every one send us road maps of their respective states with localities known to them plotted thereon? Also pencil sketches of individual localities—how they may be reached—what minerals are available—would be appreciated. All this information will be recorded and filed. Then when a subscriber writes in for information on mineral localities of any state we shall be in a better position to assist him.

In this issue we present quite a comprehensive discussion comparing the pebbles of the Witwatersrand with those of the Swaziland formation in the Rand, South Africa. The Rand, as our readers undoubtedly know, is the world's greatest gold field. We are sure that this article will be as interesting to our readers as it has been to the Editor.

Can You Tell Me?

Why it is that every member of a mineral club is not a subscriber to a mineral magazine?

Why it is that when a number of minerals are listed in the average article they do not appear in alphabetical order?

Why it is that the average collector persists in struggling through life with dirty, poorly displayed and unattractive specimens?

Peter Zodac

ROCKS and MINERALS

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The Official Journal of the ROCKS and MINERALS ASSOCIATION

WHOLE NO. 88

THE MONTANA AGATE

By A. J. HARSTAD

This is a compromise. For a long time I have been promising Mr. Zodac the second half of "Agates and such". Looking over the outline of that half I find that the chapter on Montana Agate would make a lenghty article alone so I will get that out now and try not to delay the balance much longer.

Let me make it clear right here, that when I use the word "agate" in this article, without other designation, I am referring to that type of chalcedony, occuring in rolled pebbles or nodules, containing spots, clouds or bands of color or imitative or dendritic markings, found mainly along the Yellowstone River in Eastern Montana and generally known as Montana "moss", "scenic" or "ribbon" agate.

First: a review of the commercial features. Of all the minerals I have handled, this is the hardest to buy and the hardest to sell with any degree of satisfaction to all concerned. The recent activity in gem cutting and mineral collecting has stimulated the writing of new books along these lines. Before this time, however, the most important books on these subjects, American and to a great extent English, also, were published a generation or so ago. Many of these books in considering the Montana Agate in more or less detail, emphasize the abundance, high quality and relatively low price of the rough material. True enough—a generation or more ago. Most of the recent recruits in this field have gained their impressions of this agate from persuing the text and illustrations in the older books, and to some extent the later ones, plus possibly a certain amount of copied or rehashed material that sometimes gets into popular print. Then there is the factor of a considerable class of over-enthusiastic but underinformed people, who have helped to spread the impression that the good ship Montana is ballasted with fine agate. Thus the uninformed public has been lead to expect more from this agate than can be realized through normal channels at the present time.

One trouble from the commercial standpoint is the lack of uniformity in the quality of the field run material. It is possible to find two agates within a few feet of each other, one may be the size of an egg or smaller and be shot full of good markings and the other may be as big as a cocoanut or even larger and be nothing but a solid ball of chalcedony without a single marking worth the trouble of cutting. Some nodules may be too dark or muddy in color, others may have plenty of markings but these may be merely small dots lacking in beauty or interest. Many are so badly cracked and checked as to be worthless and in others the markings may be so few in proportion to the waste as to require an excessive amount of time and expense to recover the markings. Add to this the fact that now the supply in general has been drastically depleted and you will probably have a different and certainly a more nearly correct picture of the present situation.

My guess would be that not over

10% of the present day production is what we old timers call fine agate and probably less than 5% would come up to what many of the uninformed expect to be able to get. As to a fair price for this material let me say that any price per pound can and quite often does mean exactly nothing unless a fair and frank decription goes with the quotation and that description is written by some one who knows Montana Agate from real experience. I doubt that there is now available, enough of the material to make practicable any sort of general grading standards. A price per pound for the fair to good material and by the specimen for the superfine is probably the most satisfactory solution. What should that price be? Your guess is as good as mine. I have bought agate at .10 per lb. and lost money and paid $2.00 per lb. and made money. As one who has gained what knowledge he has of the subject from a quarter of a century of thought, observation and handling of the material and never gotten Aesop's Fables or Gulliver's Travels mixed up with his mineralogical reference library, I will say that judging on a basis of true worth, relative merit and comparative rarity, even a fair grade of this agate is worth two or three times as much per pound as many of the other, now much touted, cryptocrystalline quartz minerals no matter what "Box office" names under which some of them may now be masquerading. Luckily, you will not yet have to pay any such prices for reasonably acceptable material. True appreciation of the agate has not yet reached any such point among the "Alice in Wonderland" branch of the mineral collecting fraternity.

Many of the people who gather these agates for the markets have but little knowledge of merchandising qualities. The result is that all is "agate" that comes into their bags. Some day one of the five ton truck collectors will drive up Wolf Creek on a specimen gathering trip (or should I say "safari") and there discover a new agate field. But it will not be a new field. It will simply be the place where I dumped the hundreds of pounds of worthless agate I have bought "unsight, unseen" in my time.

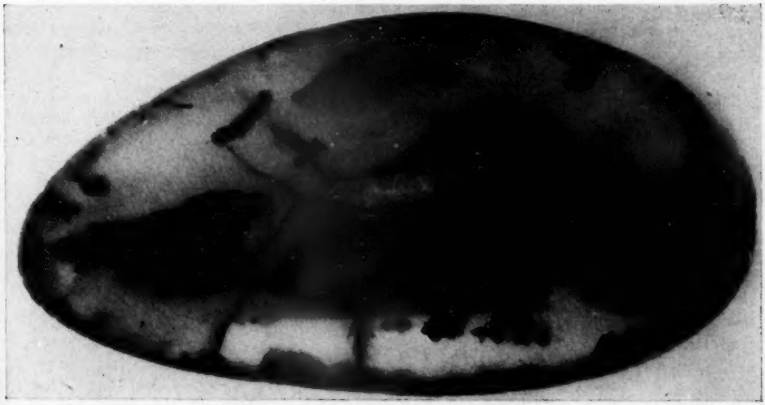
Maybe I should define what an old timer calls fine agate. Let me take you back with me twenty-five years or more. Then it was possible to obtain fairly uniform lots of agate. These would average nodules or broken pieces of probably half a pound each, the chalcedony generally with fair to good translucency and for each of these pieces there would likely be an average of one or more of the larger "scenes" or from 25 to 50 desirable ring settings. And the price was usually around .50 per lb. "Them days —and them agates—are gone forever".

This does not mean that no more fine agate is found in the locality. It is simply making clear that such production is now relatively limited; that a great deal if not most of the fine agate finds its way into the hands of the local cutters in the area and is cut there and that others cutters must expect to have to buy considerable poundage with attendant proportion of waste in order to get a comparatively few good markings.

All of you have seen illustrations of selected specimens in museums or from dealers' shops. Let me now illustrate for you a specimen of typical, fine, old timers' material, that was not cut to bring out any scenery or imitative markings but simply as a relatively large slab of fine Montana Agate. The slab measures 4x8 inches and is a section of a nodule. The chalcedony is translucent, the markings plentiful and bold. This specimen shows features that will be taken up in detail later on, such as banding, crystalline center, markings along the outer edge and even some wedged pebbles in the cavity in the back of the slab. This slab was sawed, polished and presented to me by Major Reiner of Helena and in addition to its own qualities is also a fine example of large area sawing and polishing. From a waste end, also in my possession, I judge this agate must have weighed well over ten pounds before cutting. Possibly many of you expected that this would show "scenery". Let me explain that the bringing out of scenery markings is mainly a matter of care and skill on the part of the cutter

in orienting the rough material. A marking that may be only an uninteresting blotch of color when viewed from one angle may develop into a very beautiful scene if turned, sometimes only a few degrees. Some of the markings in this slab could be thus developed if cut into smaller pieces. Some of you might be wondering what such a slab is worth. While it is not for sale I will state that, considering size, quality and workmanship, $25.00 would be a very reasonable price. I hope that this makes the situation clearer and that when you purchase rough agate at .50 to .75 per lb you must expect to get practically "field run" material with a proportionately large amount of waste and fewer good markings. One thing more, Major Reiner and other cutters have told me that it is now known that this agate averages an unexpected percentage of rainbow or "Iris" agate. This comes of course mainly from the translucent, chalcedony parts of these agates and which ordinarily would be sheer waste. There is no method of distinguishing this in the nodule or large fragment but in slabs or smaller pieces if they exhibit a sort of opalescent sheen it is quite likely that by proper cutting the rainbow effect will be brought out. Ordinarily, cutting in thin slabs, the thinner the better and at right angles to the banding, will bring out this effect if the material possesses that quality at all.

Many people have asked me about a fair price for cut agates. Here we are on surer ground in that very few cutters of experience with the material are likely to spend time and money in cutting and trying to sell something that has no merit at all. In other words almost any cut agate is likely to be worth something while a great deal of the rough is worthless or nearly so. I believe that any cut agate purchased from established and experienced dealers or the cutters in the agate area will come close to being worth the price asked. Many attractive settings sell in the $1.00 to $2.50 price range. Better ones from $2.50 to $10.00 and I have seen some priced at from $50 to $150 each. It is simply a matter of this; that when you pay $1.00 to $2.50 you are likely getting one of 999 and when you pay $10.00 it is likely the outstanding one of the thousand. When you pay $50 to $150 you are then probably getting one in ten or a hundred thousand. Some of these prices seem high but on the basis that rarity of a particular piece is and should be a factor in the price I think that in general the prices asked are justified. Surely those who cut and handle hundreds and thousands of these



A Fine Moss Agate From Montana.

should be the best judges of relative merit or rarity. Just to keep the high moral plane of these articles from tilting a bit, I will add that I have no cut Montana agates to sell at this time. But to be safe let me suggest that you make sure of the experience as well as other qualities of the dealer before you make a large investment in cut agate. Because when amateur buyer meets amateur seller some mighty strange things can happen.

Now, for a little speculation as to the genesis of this agate. A couple of years ago I read an article in a contemporary mineral magazine headlined "Montana Agate pseudo after Wood". Let me state that out of all the agates I have handled not ONE has shown any evidence of any other origin than from deposits in amygdaloidal cavities. In this opinion I am supported by all whom I have consulted and whose experience have been such as to make their opinions worth considering. None of us have ever had anything come up that might connect the origin of this agate with wood or as an associate of silicified wood. Nothing about them points to anything but an amygdaloidal origin. The clinching point in my estimation would be this, that while these are not particularly known or noted for their banding many of them do show visible banding and in my opinion many more would show it under magnification and as far as the banding itself is concerned it is in every way typical of the banding of the Brazil, Lake Superior and other banded agates all of which are generally considered to be of amygdaloidal origin. Now, bear in mind that this agate is of a distinctive type, with certain characteristics that to the experienced eye distinguish it from all other agates and from other rolled pebbles in the field. Quite readily I admit that rolled silicified wood may be and has been found in the field but that its origin has anything to do with or is even contemporary with this agate I doubt very much. That some of this wood may contain mossy markings similar to that of the agate I freely concede because such occurrences have been noted elsewhere. Therefore the presence of "typical Montana moss" does not prove anything. Most of you are familiar with a certain type of chalcedony, fairly translucent, with clouds of yellowish, reddish or brown color that is found in some deposits of agatized wood, probably not wood but possibly a cast after wood. Some of the rolled Montana agate resembles this chalcedony very much but the exterior which is a very definite characteristic of Montana agate is just the same as the mossy Montana agate. In my opinion both are of common origin, from amygdaloidal cavities and not as pseudos after wood. There should be borne in mind also that the banding and coloring in some specimens of agate, if broken into pieces destroying the nodular shape and obliterating the evidence of rolling, might conceivably, in fact by amateurs easily be mistaken for wood.

I have done much observing and thinking in connection with this agate. I offer it as pure guesswork but here is one of my conclusions, that it must have originated from a very extensive rock mass. The vast quantity of the agate that has been recovered from the large area during the activity of the field, plus the probable vast quantity that may be commercially unrecoverable due to being mixed with the other gravels at some distance under the surface would alone indicate this. Certain features point to the conclusion that all of it came from a common formation with little room for doubt on that point but other features seem to indicate that this formation must have been extensive enough to allow of different stages of the forming and solidification to go on at one and the same time or to allow different forces to work concurrently. Granted this premise we can account for some being banded and others not, some have lots of mossy or colored markings in the interior and others none, some have only black mossy markings, some have bands or clouds of lighter colors and some have both. Some are solid chalcedony and some show central cavities that may be hollow, lined with drusy quartz or filled with crystalline quartz. Before I overlook it let me state that while these agates show many features of other agates, including the

"tube of escape", so far I have not encountered any that show amethystine quartz in the central cavities nor any colored quartz and but very few that show a combination of curved and straight bands and of the latter but very poor examples. I am not contending that these do not exist, but simply that I have not noted them. Proceeding along the theory just outlined, we can imagine instances when the cavity may have become wholly filled with jelly-like silica before it hardened and in others the process may have been gradual or interrupted enough to produce banding. I admit the possibility that all of them may be microscopically banded. Again in one part of the rock mass the percolating solutions may have carried an iron oxide coloring matter and this color may have become diffused in the silica in much the same way as dropping a little colored pigment into some white paint and giving it a gentle motion to form clouds of color. Or the color might have been spread by some other force. Where banding took place the tendency then would be for the coloring matter to follow the banding and thus form the "Ribband" variety. In other parts or at different stages the coloring matter must have been some form of manganese and the conditions must have been such as to allow this coloring matter, time, space and flexibility enough in the silica to allow it to form or crystallize into the imitative or dendritic forms. It is noteworthy in considering this to state that many of these agates, probably by a great deal the larger proportion, are full of black markings extending inward from the outer surface from ¼ to about ¾ inches or more. This outer surface however is generally so badly checked as to make these markings unfit for cutting. Now if we imagine this rock mass extensive enough so that part of the silica had solidified before the manganese solutions came into play leaving other nodules wholly or partly in the jelly-like stage, we can account for many with no markings in the interior of the nodule and others with numerous markings both in the inside and along the outer surface. Of course the absence of pigment-bearing waters in some parts of the rock mass would also account for this except that I have seen some that were only a solid ball of chalcedony on the inside but still had the black markings in the outer area.

This brings me up to a popular and probably generally accepted theory in regard to the introduction of these markings, namely, that they are infiltrations into cracks in the chalcedony after it was formed, the cracks in turn being sealed with silica. I have considered this theory before but have never enlarged upon it as I have never wholly accepted it. As my experience widened I discounted this more and more. I have no D. Sc. degree but let us just look at it from the standpoint of what I will call the mechanics of the thing.

Assume, first: the forming of the chalcedony nodule and the coming of the cracks from whatever influence yau may care to imagine. Remember, that in many instances this would require a nearly thorough shattering of the chalcedony to make room for the markings. Then would come the pigment bearing solutions to fill or partially fill these cracks and remember also in some instances this would involve penetrating as much as 3 or 4 inches into the chalcedony, depositing one spot or marking of the pigment or mineral and leave no trail or trace of that pigment from the outside of the agate to the deposited spot. But now comes the most improbable part of it, that this crack should again become sealed by means of silica-bearing solutions whether those solutions caried the pigment or came later and that that silica would be of the same color, same degree of purity and consequently same degree of optical density as the original chalcedony. If not, the presence of the original crack would be visible and while many of the agates are cracked I have seen none showing evidence that I could accept as being original cracks in the chalcedony that were later filled and sealed. I doubt that any proponent of this theory can produce an agate that will prove it.

Admittedly many of these agates are cracked and the cracks are generally along

the markings or start from them. But here is the simple thing that most of the others have overlooked, that while these markings may be very thin, probably even thinner than gold leaf, they nevertheless interrupt the homogenity of the agate just as much as a sheet of gold leaf would and consequently form a plane less resistant to cracking than the chalcedony itself when force is applied. I present the simple theory that the markings are not the result of the cracks but that the cracks are the result of the markings.

As stated before a large proportion of these agates are full of markings from the outer surface inward and they are generally cracked along these markings. Consider also that many of our creeks carry so much manganese in the water that modern rocks become covered with black coatings and we may have the basis of the supposition that the markings are due to penetration of pigment into preformed cracks. To some extent this might be possible in a modern crack in the outer surface but it can not account for the markings in the interior of the agates and I doubt that it accounts for those in the outer surface. My theory is that these cracks are due to parting along the markings either through penetration of moisture and subsequent frost or to the pounding received by river waters or glacial grinding.

Of course I would be out of character if I closed this chapter without paying my respects to "Atrypa Reticularis". In the magazine formerly referred to are a couple of statements that a Montana agate had been discovered that bore an impression after the fossil atrypa reticularis. Well, well, well, "Live and unlearn" as Old Bill used to say. However let me reassure the readers. I have not come this far in the agate game only to run out of theories now. I have two pertaining to this new and striking development. First: while I have not done any extensive agate hunting in the area I know it fairly well from other activities and I know it can get awfully hot down there at times. Out of respect for Rev. Karpinsky and others of his calling who read ROCKS and MINERALS, I will refrain from going into details about just how hot it can get but I'm wondering if this couldn't be just a case of a sun softened silica boulder enfolding a stray fossil? Or maybe the other theory is better. If you are a lover of quartz and have plenty of it go through your trays again and maybe you will find what I have found, not once but several times, a piece with a place where a percussion flake had been removed from some cause or other leaving a fracture, that, especially if softened a bit by abrasion, would be a dead ringer for "Atrypa reticularis". Or if you can't find one take a hammer or dull pointed pick and a few agate nodules and see if you can't make one.

Lately, the jewelry shops of Helana have featured Montana Agate in their windows. The stones were well cut with nice markings, the mountings were attractive and apparently of good quality, the price ranges were very reasonable but —the printed placard that accompanied each display was—well, it was Alice in Wonderland mineralogy at its worst. From the opening paragraph which classed the agate as a "rock" to the closing one which claimed it the third hardest mineral.

The cold facts are these, and those who really know these minerals will agree with me, that in the cryptocrystalline quartz minerals there is enough of beauty, interest, mystery and even rarity in good quality, so that these things could be offered to the public and sold "as is", on their own merits without any printed "medicine man" incantations to break down sales resistance.

A hasty check up shows 4000 words already with at least 4000 more to go on this one subject. So I'll have to divide it into two chapters and give you the balance later.

SMOKY QUARTZ AT CRYSTAL PEAK, COLO.

By JEROME W. HURIANEK

The smoky quartz found in the region around Crystal Peak, which is north of Florissant, Teller County, in central Colorado, is locally referred to as smoky "topaz". This region covers an area about five to ten miles long, north and south, and four or five miles wide, east and west.

Mr. A. B. Whitmore has taken up claims, north of Crystal Peak, and is also owner of "The Gem Mines", a curio store. The store is 7½ miles north of Florissant and specializes in minerals mined around Crystal Peak such as smoky quartz, amazonstone, fluorite, hematite, limonite, geothite, etc. The minerals are sold to collectors, dealers and tourists.

There are several pegmatite dikes in the locality in which vugs or pockets containing quartz crystals occur. Every pocket found so far shows that there must have been an earth movement or other disturbance in the area as the crystals have all been broken from their attachments and disarranged in the pockets.

The pockets range in size from 2x2 inches which may contain a dozen small smoky quartz crystals up to 4x6 feet which may contain from 500 to 1,000 smoky quartz and other crystals which often are of large size. The largest pocket found, as near as the writer has been able to learn, was 15 x 15 x 6 feet, and was uncovered in 1909-10. It was found and excavated by a Mr. Copeland and produced about $3,500 worth of smoky quartz, amazonite and fluorite crystals. In every pocket, moist clay is present in which crystals are embedded. With the exception of a few instances, the clay is easily washed off the crystals.

The writer has had occasion to find and dig out many small pockets containing smoky quartz crystals. Some of the pockets were found in a roadway where a grader had exposed quartz "stringers". The stringers led to the pockets of which the largest was about 12 inches long. The crystals were also embedded in moist clay and they too were broken from their attachments and disarranged. Though the clay washed off easily the crystals were found to be covered with a thin coating of hematite which was so hard that even oxalic acid failed to remove it. The crystals ranged in size from ½ up to 3 inches in length. Several were of gem quality while others were fractured and feathery.

The finest specimen of smoky quartz found by Mr. Whitmore was a twin. It was about 7 inches in diameter, about 12 inches long, and weighed 52 lbs. It is now in the U. S. National Museum at Washington, D.C.

Very few alpha quartz crystals are found in the Crystal Peak Region. The writer has found a few with extra faces but not enough faces were showing to determine if a right or a left-handed crystal was among them.

A few crystals of smoky quartz contain "phantoms" or "ghosts". Several are doubly terminated. Occasionally a smoky quartz crystal may contain an inclusion of hematite or some other mineral. Some are coated by hematite or limonite or have goethite crystals attached to them. Several pockets were opened by Mr. Whitmore, in which the smoky quartz crystals found in them showed a secondary growth of milky quartz. In a very few pockets, phenacite have been found attached to some of the smoky quartz crystals.

Although smoky quartz crystals are very common in the region, the writer finds it a great pleasure to open up a new pocket of "smokies".

SEEKING LOST AND NEW LOCALITIES

By WILBUR J. ELWELL

This is why I like collecting minerals. It takes one out into the open spaces, back to nature. I have collected at one time or another stamps, brass keys, Currier & Ives prints, antiques and Indian relics. Indian relics takes one out into the open, too. I have picked up arrow heads, pieces of broken pottery, celts, and many other items made by Indians. All I collect now, however, are single crystals and mineral specimens from localities I have been to or which I have found myself.

Here is how I found one lost locality. In 1866, danburite associated with oligoclase was found in Danbury, Conn., (the mineral received its name from Danbury as it was first found here), near the old Beaver Hat Factory of Col. E. Moss White. After much inquiry, I found that the factory was on the Padanaram Road on the North Meadow Brook (Bailey's History of Danbury). This factory, in 1920, was a sawmill which was run by a man named Hartwell; now it is a grocery store. We found the remains of the old mine but all the minerals collected were a few pieces of oligoclase and graphite—no danburite. The oldest man in the neighborhood said the mine had been opened up for nickel.

I once saw a specimen labelled as coming from Litchfield County, Conn. Now Litchfield County covers a lot of territory. Looking up the information in my mineralogical library, I found the locality in question to be 5 miles north of a certain village. On reaching this village we set the speedometer of our car at zero and went north 5 miles but could not find our objective. So we inquired for the oldest inhabitant in the vicinity and from him learned we were 3 miles east of the locality. We had gone north in the wrong valley.

The kick one gets in finding a lost or a new locality, or in prospecting, is that he gets good and tired and hungry and may see lots of trees, flowers, plants, birds, and animals that are new to him. Maybe he may run across a bed of wintergreen, a vine of wild grapes, or a blackberry patch.

I always like my first visit to a locality new to me whether I find any good specimens or not. It makes me feel satisfied to have been there. Sometimes we have trouble in finding good specimens. We don't look for them in the right formations or we may not recognize them if we do find them. Take the Portland, Conn., feldspar quarries for instance. Most all of the small crystals of columbite, tourmaline, uraninite and others are found in the albite.

I have many lost or new localities on my list which I have not yet visited. Each year much time is devoted in trying to find the lost localities from leads picked up here and there. Last year the name of a man was given me as one who could tell me much. On investigation I found that no such man ever lived in the town where he was said to reside. This was quite disappointing to me as we had travelled many miles to reach his town. The Town Clerk advised us, however, that a collector of minerals lived near him who might give us some information. On visiting this collector, I found he had one Herkimer County quartz crystal, a poor garnet, lots of pebbles and shells, and a rock which he called a meteor. Of course he could tell me nothing.

Years ago, Capt. Cook worked three small quarries for feldspar in Connecticut. One was at Warren; another at Dodgingtown; and the third near New Milford. Very few collectors have been to these localities. With the exception of a few beryl and black tourmaline crystals, we found nothing of specimen value at any of the localities, but had the fun of locating the pits in the woods.

Here is a new locality in New York State. New York City has already started a long tunnel for water which is to cost $250,000,000 and is to take

ten years to dig. The tunnel is to be from 1500 to 3000 feet below the surface and is to go under the Hudson River. Many shafts are to be sunk to the tunnel floor. The shafts and tunnel should expose many minerals of interest to collectors. The tunnel is to start from the Delaware River. The engineers say that in time, New York City will have to tap the St. Lawrence River for an additional water supply. I believe that the Editor of **Rocks and Minerals** will be able to tell you more about the minerals encountered as he no doubt will watch the shafts closely.

Waterbury, Conn. had an aqueduct tunnel finished a few years ago which cost $3,000,000. The tunnel tapped the Shepaug River. I found only a few mineral specimens at the Woodville and Bantom portals. Among the minerals found were biotite, crocidolite, a few garnets and pyrrhotite.

A few years ago we visited an old limonite mine at Clove Valley, N. Y., noted for gibbsite. We were surprised to find that the mine which consisted of three pits, full of water, was a private game preserve for wild duck. The ducks are moved from one water hole to another and as they fly over, they are shot at by a hunter (a club member) who is sitting in a blind. As we started to approach one of the pits, we noticed a large bull near it. We stopped. Shall we or shall we not, we mused. The bull looked at us. "Thou shall not pass", his actions plainly indicated. So we turned around and left. We headed for Towners, N. Y.

At Towners, which is 5 miles north of Carmel the County Seat of Putnam County, is an old limestone quarry back of the Baptist Church on Route 52, the main thoroughfare. Here we found some malacolite, tremolite and brown tourmaline crystals.

SELENITE NEAR CHARLESTOWN, OHIO

By LESTER B. BIRKHEIMER

In a cut of an abandoned right of way of a street car track, two miles southeast of Charlestown, Portage County, Ohio, many fine crystals of selenite occur. The crystals are imbedded in clay and the clay must be shovelled out.

The occurrence is on the north side of the right of way and 100 feet west of a County road. The right of way follows the north bank of the North Mahoning River. Charlestown is a little village in approximately the center of Portage County which in turn is in the northeastern part of Ohio. Charlestown is about 5 miles east of Ravenna, a little city of about 8,000.

To reach the locality, take Route 5 from Ravenna, to Charlestown to the first road which goes south off the route. Two miles on this road is the right of way and the locality is 100 feet to the right.

The discovery of the crystals was due to friends who stated that they had picked up some isinglass or mica at the locality. The writer suspected selenite and investigation proved this to be correct.

The selenite crystals are highly phosphorescent and especially so under the cold quartz lamp. If such crystals are exposed to the light of an electric light for about a minute, and the light turned off, the crystals will glow for a few seconds, with a pale bluish-white color.

THE ORIGIN OF THE WITWATERSRAND PEBBLES

Their Relationship To the Swaziland System of Rocks

By PETER MACADAM
Benoni, Transvaal, South Africa

The pebbles of the Witwatersrand reefs (Banket) are made up of a great number of various types of rock from the less hard shale to banded chert, and banded ironstones. Though the variety of these pebbles collected is by no means complete, as will be shown, a similar varied number of rocks is seen in the Swaziland system.

I have little to add to Dr. Pirow's exhaustive study of the Witwatersrand Banket Pebbles except to bring to notice that certain of the banded ironstone and banded chert sulphidic varieties are exactly matched by identically looking auriferous reefs in the Swaziland system, both from the Eastern Transvaal and Southern Rhodesia.

Dr. R. B. Young in his book on the "Banket" has referred very clearly to the probable source of the Witwatersrand Pebbles, and Dr. Hall also has dealt exhaustively with the Swaziland system.

Over a period of ten years, many excursions were made to study the older formations or system of rocks in the various parts of the Transvaal, Natal and Swaziland, and in addition, the Geological Survey of Southern Rhodesia supplied me with an extensive collection of the common rocks and gold bearing reefs as seen and mined today in those parts. There was no difficulty met in matching these rocks with rand pebbles, even though material collected was over a wide area.

Variety of Pebbles

The number and variety of pebbles is very great, and though an attempt has been made to make a comprehensive collection, new kinds from time to time have to be added. The great number of different kinds of pebbles must naturally vary, as there occurs and exists similar variety of rock material in the more ancient older formations, such as is seen in the Swaziland system in all parts of South Africa. Some of the more common types of pebbles are dark and light quartz, shale, quartz porphyry and other varieties of igneous rocks, dolomite, schist, graphitic or carbonaceous shales, quartzite, banded cherts and ironstones. In the banded ironstones and chert are found frequently the sulphidic types carrying a little gold and in no way apparently different to gold reefs now being worked in the Swaziland system in various parts of South Africa.. In addition to occasional large pebbles there are found in many of the reefs appreciable quantities of fragmentary material made up of all kinds of both sedimentary and igneous rock. A very notable occurrence of large blocks of fragmentary material is that seen today in the Kimberley Reefs at Modder Deep Mine where individual masses of quartzite, graphitic fine and coarse shale and conglomerate up to 4 and 5 feet long are encountered in mining.. So far as is known, this find of original fragmentary material represents the largest masses of rock known to exist in any Witwatersrand Reef. The concentric banded pebbles no doubt originated from disintegration of lavas containing amygdules.

Pyritic and Faulted Pebbles

The pyritic (also referred to as sulphidic) pebbles belong mostly to the banded chert types.. Banding of these pebbles shows them in all probability to be original, as this is not seen but seldom in the quartz and other varieties. It is believed by many that the pyritic banding in the chert and ironstone varieties is not original.. On this point I must disagree, as from a close study it was noticed that almost exclusively only the chert or banded chert contained the pyritic bandings. To be able to prove the foregoing statement was probably true, opportunity was not lost in studying a conglomerate bed some 12 feet thick in the lowest part of the Moodies Series at the Old Clutha Mine, Eastern Transvaal. Here from fresh blasts of the conglomerate a great variety of material was collected. Much

of this material was in a perfectly fresh or preserved state. There occurred here also pyritic pebbles and boulders, and as the other accompanying pebbles, and matrix, were minus this pyritic banding, it may be concluded rocks of many types can be, to a very great extent, preserved in their original condition as eroded..

In addition to noting that very many of the pre-Swaziland rocks were similar to those of the present Swaziland formations, other types of rocks were observed which belong to earlier Continental land surfaces now non-existent. I would like to say, from a study of the Swaziland, and pre-Swaziland as preserved in the older Swaziland conglomerates, that the greater amount of material comprising the make-up of the Witwatersrand Reefs was from the non-oxidised zones. One finds very much less oxidised pebble material in the banket. At the same time, chert rocks may be found within a few feet of the surface unweathered. When it is taken into consideration that upwards of 24,000 feet of strata in part represents the Witwatersrand System, a great quantity of material was derived by denudation of the Swaziland rocks. That being so, one can only imagine thousands of feet of these older rocks were denuded, and as one authority I spoke to said, 'It looks like only the **grass-roots** of the ancient auriferous Swaziland formations are left."

In the Witwatersrand Bankets, pebbles showing faulted structure are frequently found, especially again in the chert types which, in some reefs, exceed the quartz varieties in quantity. It is possible to match very exactly faulted reef pebbles of the Rand with the Swaziland rocks, and this being so one may conclude the Swaziland system of rocks occupied in pre-Witwatersrand times, much the same highly tilted angles of dip as is seen in most parts of South Africa today. These specimens on view show many such corresponding types of rock.

Gold and Associated Heavy Metal And Minerals

The gold in the Witwatersrand Bankets is today generally believed to be of placer origin. As all the material comprising the bankets was derived from the Swaziland formation one might suspect the gold,etc., also came from the same source. At the same time, there occur on parts of the Rand, gold reefs and veins of hydrothermal origin, i. e. gold introduced at and about times the Witwatersrand rocks were invaded by faults and dykes. The old Struben Workings, north of Roodeport, occur in the Hospital Series in close proximity to the Rietfontein fault.

The heavy metals and minerals show that, since they were originally eroded, they have been subjected to attrition. Chromite and zircon are especially good examples of rounding by water transportation. Chromite in this form is distributed through the whole of the Witwatersrand System and may be found in any of the quartzite beds in pyritic seams away from any development of conglomerates with a little accompanying gold.

In the banket, radio-active minerals are also found; and as these too are found in the older Swaziland formations, as described by Dr. A. W. Rogers in the Geol. Transaction for 1916, one may conclude any and all material of the bankets with their accompanying quartzites and shales were derived from the varied distribution of mineral, etc. There is more gold per cubic inch or centimetre or per cubic mile or kilometre in the Swaziland beds than as a whole in the Witwatersrand; but, whereas in the Swaziland beds the gold is more diffused or unevenly distributed, in the Witwatersrand the gold is highly concentrated in the bankets.

In conclusion I would like to express my indebtedness to the Central Mining & Investment Corporation for all privileges given me and also to the other Mining Houses, as well as to Dr. Young, Dr. Pirow, Dr. Nel, Dr. Rogers, the Geological Survey of Southern Rhodesia, and to Mr. Hill, of the E. T. C., and Mr. Papenfus, of S. A. Township, for their help given me to carry out my researches. Also to Mr. McLean, General Manager of the Alba group, to J. M. Calderwood, D. F. Calderwood, Mr. Tillard and R. R. Mitchell.

RHABDOMANCY FOR THE RABID

By WALTER P. SACHS

Whether it is a heritage from the conquistadores, whose horses' footfalls have resounded everlastingly through the tall pines, scrub cedars and cactus growths of the Southwest, or whether it is the roseate faith of Coronado that has never died—whatever the source, it is certain that natives of New Mexico have been preoccupied through countless years with the legends of lost mines and hidden treasures.

It may be that the placidity of life in New Mexico urges forth the yearning for great riches with little effort. For, as much as I could determine in two years passed in that State, the search for precious ores was never prosecuted with the greatest of zeal. But the chronicler of Coronado's expedition might almost have been bounding New Mexico when he set down the words: "Granted that they did not find the riches of which they had been told, they found a place in which to search for them."

The countless traditions involving "lost" mines and virgin mineral resources need not concern us here. These tales have been told. Rather, I was fascinated in the references by New Mexicans—by the cook and the tractor "skinner," by the truck driver and the old-time cowman—to the methods used in locating underground deposits. Mostly veiled in an air of mystery, the references were to an instrument called a divining rod. Gaudily embroidered accounts were told of the efficacy of this instrument, but no one person I spoke with had ever seen it in actual successful operation. I resolved to learn more of the topic.

Divination, as for the location of underground water, precious metals, etc., by means of a divining rod, is known as **rhabdomancy.** The word springs from the Greek; rhabdos or rod, and manteia or divination. The whole process has been condemned as a "curious superstition" by the United States Geological Survey. Despite this, rhabdomancy seems to have a firm hold on popular imagination, as much as any among New Mexicans.

Apparently the subject has been provocative and the source of endless disputation. A distressing amount of literature has been written with rhabdomancy, or, the divining rod, or so-called water-witching, as its field of inquiry. One bibliography lists more than 500 writings which have this theme or make mention of it. The earliest antedates Agricola's "De re metallica," which was published in 1556. From the middle of the sixteenth century, down through the ages, the controversy seems to have gained in momentum until as recently as 1911 no less than thirty-five works have had some bearing on the divining rod.

Most commonly, the divining rod is a forked, Y-shaped twig. The prongs are held one in each hand and the butt-end points upward, just as an inverted Y. The supposition is that if the main stem of the Y is attracted downward, water or other minerals lie underneath. In such an entirely baseless theory, naturally there have crept in numerous modifications in the shape of the divining rod and its manipulation. One such modification insists that a piece of the metal prospected for must be inserted in the upright end of the inverted Y to render it efficacious in locating deposits of that metal. I have heard of a gold ring being used, a silver dollar, and even a penny!

Not quite so many variations are possible in the choice of tree from which the twig endowed with supernatural powers is to be cut. Peach seemed to be most frequently mentioned in New Mexico. Others named by various "authorities" include willow and hazel. I have heard of the apparatus being fabricated from iron and from the bones of a defunct animal!

A fact which aids in demonstrating the superstitious origin of the divining rod is evident in that the utterance of

magical words years ago was a necessary accompaniment to the ceremony of using the rod. One reference lists fifteen diverse uses of the divining rod, ranging from the detection of criminals to the curing of diseases—all incidental, of course, to the inspired purpose of locating precious ores.

Of the origin of rhabdomancy, none may speak with certainty. Its practice dates back to the misty years of antiquity. Some regard Moses' "smiting of the rock" as a reference to water witching. The genesis of the modern divining rod is said to have been in Germany and the mists of error are said to have been transplanted to England when German miners were taken there toward the end of the sixteenth century.

As I have said before, in two years of living with miners, lumbermen, saw-mill workers, cowhands and small ranch owners of New Mexico, never once, despite my inquisitiveness, did I see a divining rod in operation. All these persons preferred to sit back in the glorious sunshine of that state—and talk about it. They may have attributed magnificent deeds to the use of a forked twig, they may have spoken enchantingly of the attainment of immeasurable riches by the use of a forked twig, but they were never betrayed into a demonstration of the omnipotence of a forked twig!

Rhabdomancy appears the epitome of rosy, optimistic superstition.

REFERENCES

For those who would like to pursue the subject further: Ellis, Arthur J. **The Divining Rod, A History of Water Witching,** with a most complete bibliography. U. S. Geological Survey Water-Supply Paper 416. Washington, D. C. 1934.

For those interested in the tales of lost mines and buried treasures of the Southwest: Dobie, J. Frank **Coronado's Children.** Literary Guild. New York. 1931.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of ROCKS and MINERALS published MONTHLY at PEEKSKILL, N. Y., for OCTOBER 1st, 1937. — State of New York, County of Westchester.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared PETER ZODAC, who, having been duly sworn according to law, deposes and says that he is the EDITOR and PUBLISHER of ROCKS and MINERALS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the name and address of the publisher, editor, managing editor, and business manager is PETER ZODAC, PEEKSKILL, N. Y.

2. That the owner is: PETER ZODAC, PEEKSKILL, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: NONE.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the Stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

PETER ZODAC

Sworn to and subscribed before me this 29th day of September, 1938.

THOMAS C. MacPHERSON

My commission expires March 30, 1939.

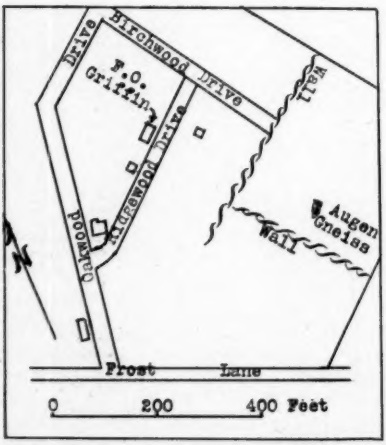
AUGEN GNEISS IN PEEKSKILL, N. Y.

By PETER ZODAC
Editor Rocks and Minerals

In the fall of 1933, Mr. H. Alban Anderson, of Peekskill, showed the writer a specimen of a peculiar type of gneiss which was obtained near Frost Lane, in the city. It was immediately recognized as augen gneiss but was of a character unknown in this section and perhaps in the entire state. The specimen was a dark hornblendic gneiss with white patches of albite having black centers of magnetite throughout. It was so attractive and unusual that the occurrence warranted immediate investigation. Within a few days, Wed., Nov. 22, 1933, the writer, accompanied by Mr. Anderson, and his cousin, Gilbert (now deceased), paid a visit to the locality.

The occurrence was found to be on a small plot of ground on Ridgewood Drive where a new house was in the course of construction. The owner and builder of the house, Mr. Frederick Oakley Griffin, was present and he not only told us how the rock was found but very graciously gave us many specimens.

In the summer of 1933, Mr. Griffin, a mason contractor, speciallizing in fireplaces, began the construction of his new home. This was in a newly developed section in the northern part of Peekskill, about 250 feet north of Frost Lane. Ridgewood Drive runs east and then north off Oakwood Drive which in turn runs north off Frost Lane—the latter runs east off N. Division Street and parallels the new Parkway about 300 feet to the south.



A sketch map showing location of augen gneiss occurrence.

The exterior of Mr. Griffin's new home was to be of rough country rock and its location being close to an old stone wall the rock in this wall went into the foundation and structure. In the breaking up of these rocks, he ran across the augen gneiss whose singular beauty and odd form made him wonder what it could be. So it was that samples of the gneiss were passed out to friends, some of which reached Mr. Anderson—who has the finest collection of minerals around Peekskill and who in turn brought them to the writer's attention.

The gneiss was found by Mr. Griffin to consist of three loose boulders in the wall. One boulder was 3x3x3 feet; another was 1x6x6 feet; and the third was 1x1½x12 feet—the latter was partly buried. These boulders were rounded which indicated they had been transported by ice or water—evidently remnents of a glacial deposit. But from whence did they come? This was indeed a mystery as nothing of their like was ever seen by the writer who had roamed over the surrounding country many times; nor had he ever heard of such an occurrence anywhere in the state. Rush of matters, however, prevented further investigation for the time being.

It was a year and a half later, Fri., May 17, 1935, that the writer made his second visit to the locality, accompanied again by Mr. Anderson and also by Mr. Joe DeLuca. Mr. Griffin was not home but the house of course was finished. No further information on the gneiss was obtained and we soon left without securing any specimens.

The third visit was made Fri., Aug. 9, 1935, accompanied by Mr. Emmet Doherty and fortunately we found Mr. Griffin at home. He greeted us very cordially. We inspected the house from top to bottom, inside and out. It was admirably built and worthy of inspection. We easily saw that many fine specimens of augen gneiss went into the construction of the house—in the outside walls, fireplace, and even in the foundation, nevertheless, Mr. Griffin had a large pile of loose blocks stored in the cellar and again he loaded us with specimens. Just as we were about to leave, the writer casually remarked:

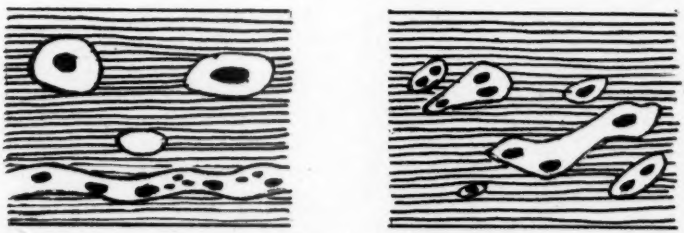
"Have you seen any more of this material anywhere else around here, Mr. Griffin?"

"Oh, yes," he replied, "over in the field to the east of us but it is not of as good a quality as this is."

This sounded interesting and we wanted to see the occurrence and again Mr. Griffin came to our assistance. He guided us to a little clump of rocks about 300 feet away. It was the real thing all right—small boulders of augen gneiss lying on top of the ground but as he had said they were not of good quality. But then to our amazement and great joy, augen gneiss was actually found outcropping, only a few feet away! Augen gneiss is, therefore, an actual Peekskill occurrence.

The occurrence is almost in the south center, more to the southwest corner, of a large, open, rolling field. It forms an outcrop 12x5 feet in area rising about 2 feet above the ground and striking slightly northeast-southwest. The dip of the gneissic structure appears to be almost vertical. The gneiss had been glaciated and weathered so that the "eyes" are not as conspicuous as those on fresh surfaces and being small and rounded they resemble a myriad of birds' eyes. The eyes were especially prevalent in the center of the outcrop and on the faces paralleling the dip; towards the northern and southern ends they disappear and the rock grades into ordinary hornblende gneiss—at least it does so on the surface. Because the surrounding terrain was heavily covered by brush, plants, and other growth, further investigation was left for late fall when the leaves would disappear.

Sat., Dec. 14, 1935, the writer paid his fourth visit to the locality, alone. The entire field and the adjacent one to the north was thoroughly examined but no further signs of augen gneiss were visible. The chief rock in the area was the ordinary dark hornblende gneiss which easily was at least 500 feet thick —its full width could not be determined due to a heavy mantle of glacial drift. It outcropped in many places in small masses that seldom reached 2 feet above ground. The gneiss, furthermore, was heavily glaciated and near the west wall of the first field, a short distance northwest of the augen gneiss outcrop, glacial grooves, one inch deep and at least 5 feet long, running slightly northeast—southwest and parallel with the strike, were noted. Small pegmatite dikes were also visible in the gneiss and they too parallel the strike.



Two Unusual Specimens of Augen Gneiss.

Quite a number of limestone boulders, gray in color, were noted in these fields. One large boulder had a 3 inch vein of basanite (black velvety variety of quartz) in it. Though basanite, in the form of loose pebbles, is very common in southeastern New York, this was the first instance known to the writer of it being associated with limestone. Furthermore he knows of but one occurrence in the state where a limestone deposit contains basanite. This is an abandoned limestone quarry 3 miles north of Crown Point[1]—about 175 miles north of Peekskill—in which basanite occurs as an 18 inch vein exposed for about 100 feet. It may be possible that the limestone around Crown Point may be the source of the basanite occurring in southeastern New York.

Because the dip of the gneiss is practically vertical and because the surface of many outcrops are covered by lichens, not taking into account that much of the rock is hidden by glacial drift, it may be possible that augen gneiss may be present to the north of its outcrop.

To the south, the ground dips quite steeply towards Frost Lane, about 300 feet away, while 200 feet further it forms a swamp. No rock outcrops were visible in this section.

The augen gneiss outcrop is about 400 feet east of and about 25 feet higher than the foundation of Mr. Griffin's house. As the writer never saw the three boulders originally found by Mr. Griffin, only fragments of them, it was not possible to check up on them as being rounded—they might have only been glaciated. Consequently they would not have had to travel far and must have come from the outcrop near by.

Professor Charles Palache of Harvard University who has examined specimens of the augen gneiss sent him, says: "It is a case of shifting of the material under metamorphism. All the iron that was originally in the area now occupied by each eye has migrated to the center to form the magnetite crystal, robbing the other minerals of what iron was there. I have never seen it with magnetite before but have seen garnet crystals surrounded by such a white zone."

The following minerals were noted in the augen gneiss:

Albite: This is the most conspicuous mineral in the dark gneiss as it is pure white in color and is quite plentiful. It is minutely xline, striated and forms the white part of the "Augen Gneiss". It is generally either circular or elliptical but now and then these forms intersect one another or else the albite forms almost a straight narrow band following the schistosity of the gneiss. As a rule, the albite is about ¼" in diameter, although it may slightly exceed this.

Amphibole (Hornblende): Black, xline, as a constituent of hornblende gneiss.

Chalcopyrite: Occurs in small masses and grains. In the gneiss itself, it occurs as grains scattered in all directions although at times they unite to form minute veins which follow the schistosity of the gneiss. But it is in albite where chalcopyrite attains its greatest development as here it occurs in small masses and which almost always are entirely embedded in magnetite or else penetrate it. In many instances chalcopyrite appears to replace magnetite.

Garnet: Occurs as minutely, small grains, reddish pink in color, associated chiefly with magnetite.

Hematite: A small thin reddish crust was noted on one cleavage face of magnetite.

Limonite: Is common as dark brown stains on gneiss.

Limonite (Yellow Ocher): Occurs in small cavities in magnetite as alterations after magnetite.

Magnetite: This is the next most conspicuous mineral and it forms the dark part of the eye in augen gneiss. It is lustrous black in color, sometimes almost completely filling the albite, when the albite forms a thin halo around it. If the albite is flattened, elliptical or rounded, magnetite likewise follows this outline. In no case was magnetite seen where it broke through the albite; it was entirely surrounded by the latter

[1] Zodac, Peter—*The Editor Goes Afield*. ROCKS AND MINERALS. Jan. 1937, p. 12.

mineral. In one instance the magnetite was slightly tarnished. In a vein of albite, the magnetite masses are not all of the same size; they vary. More than one mass of magnetite may be present in albite; and in a few instances an albite may be free of magnetite.

Malachite: This is common as bluish-green stains on gneiss. In one instance the stain formed a band 4" long and ½" wide.

Pyrite: Minutely small grains in gneiss.

Pyrrhotite: Minutely small grains in gneiss.

The following minerals were noted in the ordinary gneiss of the locality. Some hornblende schist is also present.

Albite: Glassy and xline as a constituent of a light-colored gneiss.

Albite (Peristerite): Glassy and xline with bluish chatoyancy as constituent of light-colored gneiss.

Amphibole (Hornblende): Dark green xline mass as constituent of hornblende schist; same color and form as a constituent of a light-colored gneiss.

Epidote: Thin crust on gneiss.

Limonite: Brown stain on gneiss.

Opal (Hyalite): White crust stained dark brown by limonite on hornblende schist.

Pyrite: Small grains in gneiss.

Pyrrhotite: Small grains in gneiss.

Quartz (Smoky): Small masses as constitutents of gneiss.

Quartz (Milky): One pure specimen was found.

Titanite: Small brown xls, good, in gneiss.

The grateful thanks of the writer are extended to Mr. H. Alban Anderson for calling his attention to the new occurrence; to Professor Charles Palache for examining the specimens sent him; and especially is he indebted to Mr. Frederick Oakley Griffin for the many nice specimens given him and for the valuable assistance rendered in the preparation of this article. Were it not for Mr. Griffin's interest to find out what the strange looking rock might be, this very unique Peekskill augen gneiss would still be unknown.

ROCKS SHATTERED BY SUN RAYS

The results of insolatjon—the shattering of solid rock by the rays of the sun—are demonstrated in an exhibit recently added to the department of geology at Field Museum of Natural History, Chicago, Ill. The most striking examples were collected by the Marshal Field North Arabian Desert Expedition, led by Dr. Henry Field of the museum's staff.

"In the deserts and upon the mountain tops the sun's rays can shatter solid rock, breaking it into fragments and covering the ground with an accumulation of rocky debris," states Henry W. Nichols, chief curator of the department of geology. "This destruction is a consequence of the rapid heating of the rock, called insolation, during the day, followed by rapid cooling through radiation after sunset. When the heating and cooling are sufficiently rapid the accompanying expansion and contraction induce strains greater than the brittle rock can endure. The rock breaks and chips, and even large pieces are flaked away from the surface. Campers have often been startled by a similar disruption of rock when a camp-fire built against a ledge has heated the rock too rapidly and fragments fly off with explosive and sometimes dangerous violence.

"Over most of the world, the atmosphere, which tempers the effect of the sun's rays, protects rocks from much of this damage by insolation. On mountain tops, where the sun's rays pass through less atmosphere, their power is not reduced as much as at lower altitudes. The air over deserts is exceedingly dry, and as the atmosheric agent which absorbs most energy from sunlight is water vapor, sunlight over deserts has more power than elsewhere. Since cooling by night in deserts is less retarded by the blanketing effect of water vapor in the air, the cooling of the rock is more rapid and the cooling strains induced are more severe."

FOSSILS AND FOSSIL COLLECTING

By IRVING G. REIMANN
CURATOR OF GEOLOGY, BUFFALO MUSEUM OF SCIENCE

Part VI Molds and Casts

In the manufacture of statuary and countless other objects human artisans imitate a process of nature which has been operative for hundreds of millions of years. Wax, plaster, concrete, metals, and plastics, such as bakelite, are poured or pressed into molds, producing externally identical images of the original object from which the mold was made. In the same manner, although much more slowly, nature uses calcite, silica, opal, selenite, celestite, barite, marcastite, sphalerite, hematite, and, more rarely, other minerals to accomplish the same purpose.

Nature's molds are made by the solution of rock-embedded objects (fossils, for the purpose of this discussion) which thereby leaves hollow spaces in the surrounding matrix. These hollow spaces are molds which frequently preserve the minute surface features of the dissolved fossil. In the case of shells, the mold may retain the impressions of both the outer and inner surface, if the interior of the shell had become filled with the matrix or some other material. If the two valves of the shell were so tightly closed that the interior body cavity remained empty, the resultant mold would be hollow and would retain only the impression of the exterior.

Certain porous sandstones, such as the Oriskany and the "Chemung" of New York State commonly preserve their fossils as molds only. Occasionally, due to compression of the strata after solution of the shale, external molds may become impressed on the internal mold, so that either half of the mold shows features normally characteristic of the opposite half.

During the excavation of Pompeii, the searchers noticed that skeletons were frequently found in hollow spaces in the volcanic ash. They found that, when plaster was poured into these molds, casts were obtained of the bodies of the unfortunate victims of the volcano; man-made casts from nature-made molds.

Many of the trilobites and other fossils described in the Paleontology of New York are known only from their molds left in chert. The original calcareous fossils, dissolved by weathering, had disappeared, but wax squeezes taken from the natural molds proved as satisfactory for identification as the actual fossils would have been.

It is not unusual for nature to carry this process farther. Circulating underground water, supersaturated with any one of several minerals, often finds the hollow molds of fossils a convenient depository for its overburden. The minerals filling such cavities produce objects known as casts, some of which reproduce the original fossil with great fidelity.

One Western New York locality is noted for its marcasite concretions and their contained fossil. Almost every one of the more or less spherical concretions contains a fossil shell or creature of some kind. Usually they are completely surrounded by the radially crystallized marcasite, but now and then a specimen is found in which a part of the fossil protrudes. The majority of the concretions split easily around the fossil and usually show a beautiful internal mold. The shell portion, when present, is commonly preserved as marcasite, sphalerite, calcite, or sometimes selenite, and often adheres to the matrix. Sometimes marcasitized fossils are found free in the shales. These almost invariably are internal molds, when pelecypods or gastropods, and external molds when brachiopods or trilobites.

Partially filled internal molds are often valuable criteria in determining the original attitude of the shell in the entombing sediments, and hence of the attitude of the sediments themselves. Semifluid mud seeping into and partly

filling an empty shell (a not infrequent happening) would settle with a horizontal upper surface. The remainder of the space remained empty or became filled with additional mineral matter of different composition, while the original mud gradually would lithify. In any event the primary horizontal surface would be preserved, and careful collecting would determine whether or not that surface were still horizontal. If it were not, then the enclosing strata had been tilted to the same degree. This is of more interest than it may appear to be at first thought, because strata, particularly under conditions of rapid accumulation, are rarely deposited in a strictly horizontal plane, and the only clue to the attitude of deposition of ancient strata is some such natural fossil "level," which permits an accurate measure of the subsequent tilting.

THE MAMMOTH

It is the belief of the Tungus witch doctors of Siberia that the giant prehistoric elephant known as the mammoth still exists as a huge burrowing rat, whose death is certain the moment he sees the sun, states Dr. Henry Field, Curator of Physical Anthropology at Field Museum of Natural History, Chicago, Ill., in an article "Man and the Mammoth" which appeared in the August issue of Field Museum News. Other Siberian natives believe that earthquakes are caused by these gigantic "rats" tunneling at high speed just below the surface of the ground.

On exhibition in the Division of Paleontology at Field Museum is a complete skeleton of a mammoth and a large mural painting representing it as it appeared in life; and in the Hall of the Stone Age are carvings on mammoth ivory by prehistoric men, necklaces of mammoth ivory beads, and a superb pair of mammoth tusks from the Lena River, Siberia.

"The mammoth, which roamed over Europe in Pleistocene times, became extinct more than a hundred centuries before the birth of Christ," writes Dr. Field. "Prehistoric man hunted and trapped this huge animal for food, made beads of his ivory tusks, and tools of his long bones. On smooth pieces of bone, too, he engraved, with tools of flint, symbolic drawings of magical and religious significance.

"The mammoth was almost thirteen feet tall at the shoulder and was covered with long, reddish-brown hair. Enormous, curved tusks protruded from his jaws. Like Nebuchadnezzar, he was herbivorous, but unlike the temperamental old king, he made a habit of grass-eating—with him it was not merely the momentary demonstration of a fit of anger.

"In 1611 Josias Logan brought to London an 'elephant' tusk obtained by Samoyeds near the Potchora River in Arctic Russia. In 1644 Mikhail Staduschin verified reports that in northeastern Siberia 'large islands rich in great elephant bones' existed. Since that time mammoth ivory has been a profitable article of commerce, the world market being in London. In 1901 the Beresovka mammoth was carried on twenty sledges to the Museum of the Academy of Sciences in Petrograd.. During the past decade new mammoths have been found in Soviet Arctic territory, and plans are now in progress to salvage parts of these animals for study.. Preserved for tens of thousands of years beneath the frozen tundra, bodies of mammoths were exposed by unusual thaws, and the meat was eaten by ravenous dogs."

THE AMATEUR LAPIDARY

Amateur and professional lapidaries are cordially invited to submit contributions and so make this department of interest to all.

NATURE AS A LAPIDARY

The average lapidary may not know that many minerals and even rocks may be found each with one surface that was polished by nature. To a geologist, such polished specimens are very common as he encounters them everywhere in areas of disturbances as in faults, slip zones,etc, and even in glaciated regions. Minerals or rocks with such polished faces are said to be slickensided and they often form interesting specimens.

In the anthracite mines of Tamaqua, Penn., coal has been found underground whose vertical face, 15 or more feet high, was often polished so highly that one could almost see his reflection in it. In the same mine, black dirt, apparently decomposed coal, has also been found whose contact face with a rock may be highly polished. It seems inconceivable that an incoherent substance like powdered coal may take a polish.

In the Scott mine, one of the magnetite mines at Sterling Lake, Orange County, N. Y., epidote is very commonly present in slip joints and faults. This epidote, pistachio green in color, commonly has one face polished.

At the northwest end of the first tunnel of the New York Central Railroad, about one mile north of Peekskill, a vertical rock face about 20 feet high and 10 feet wide, is exposed which has been highly polishd by faulting. Unfortunately its luster has been reduced due to soot from passing locomotives.

In the Hudson Valley of New York, whole areas many square miles in extent contain rocks whose exposed faces have been highly polished by glaciers. Here again the luster has been greatly reduced due to weathering.

It would be of interest to any lapidary if he would make a collection of specimens showing nature's polish and compare it with a collection of man's polish.

EAST BAY MINERAL SOCIETY

Twenty-eight enthusiastic mineralogists residing in the Oakland, Calif., district, met together on August 31, 1938, to organize the East Bay Mineral Society. A constitution and by-laws were adopted at this meeting, and officers elected to serve until the first annual meeting to be held in May, 1939.

Orlin J. Bell, prominent San Francisco attorney, was elected president and Mrs. F. W. Buhn, 3027 60th Ave., Oakland, the secretary.

Dues of the Society, $1.00 a year.

WITH OUR MEMBERS

A card mailed in Visby, Sweden, was received from Mr. and Mrs. Gunnar Bjareby of Boston who are touring the northern countries of Europe. They write that on Thursday, Sept. 22, while collecting specimens on the dumps at Ytterby, Sweden, they ran into Prof. Austin F. Rogers of Leland Stanford University. All collecting ceased while these members, two from Massachusetts and one from California, meeting for the first time and at a mine dump in a foreign country, suspended activities to talk on matters of mutual interest.

P. G. Downes of Belmont, Mass., who during the past summer was up in the wilds of northern Canada, has returned home. On his long trip he managed to see a good part of the country. The region stretching from Prince Albert, Sask., to Great Slave Lake to Great Bear Lake, was of special interest to him. The Eldorado pitchblende and silver mine on Labine Point, in the southeastern corner of Great Bear Lake and the Yellowknife gold strike, Great Slave Lake, were two localities where specimens were collected.

C. N. Joyner, who has resided in Tientsin, China, for a number of years, has recently returned to the States. His present address is Gulfport, Miss. Mr. Joyner has sent us an interesting article on jade which will be printed in **Rocks and Minerals** in an early issue.

Ralph Ota, formerly of California, has moved to Kobe, Japan. In a recent letter he writes of a number of mines which he plans to visit and if interesting minerals are found he may write an article on them for **Rocks and Minerals.**

Ernest Marshall, of Bethel, Conn., is on a two months tour of Mexico. He plans to visit some of the famous mines of the southern republic, collect a few specimens, take some pictures, enjoy the scenery, etc., etc.

Miss Evelyn Waite of Crestwood, N. Y. spent the summer in New Hampshire. Rumors have it that she brought home 500 pounds of minerals.

C. W. Reitch, one of the founders of the Colorado Mineralogical Society, has moved from Denver, Colo., to El Paso, Texas.

Miss Eleanor Wales, for the past two years with Miss Burt's School, in Peekskill, N. Y., now resides on the island of Nantucket, off the coast of Massachusetts. Miss Wales is connected with the public school system on the island.

R. E. Myers, of the Department of Geology, Muhlenberg College, Allentown, Penn., was in Central America this summer where some interesting localities in Honduras were visited. Mr. Myers is Director of Tours of the Rocks and Minerals Association.

Clifford Frondel of Massachusetts Institute of Technology, Cambridge, Mass., spent his summer months collecting at mines and quarries in southeastern New York. From some of the leanest dumps in this area, he would uncover specimens of such unusual interest or rarity, that it was astounding. Were it not that we had personally guided him to many of the localities we might have suspected that he had coached some of the specimens and then dragged them out for our benefit. As it was, **we** found some good specimens too. We sincerely hope Mr. Frondel will revisit southeastern New York next summer and that we may be privileged to accompany him again. As a collector, we have never seen his equal.

Fred and Ed. Schneider, brothers from Woodhaven, N. Y., have a pet locality near Ellenville, N. Y., which they visit regularly every summer. Some unusually fine quartz crystals have been found there by them.

Collections Recently Seen

Capt. Arthur Haas, of Roxbury Station, Conn., has a general collection, nicely arranged and displayed, which is housed in a large room of his spacious garage.

Floyd Faux, of Bethlehem, Penn., who specializes in Pennsylvanian minerals, has a very fine collection. Many of the specimens he personally collected.

Ernest Heusser, of Ellenville, N. Y., has a small but very fine collection. Many of his specimens are choice museum pieces which were obtained by purchase of dealers advertising in **Rocks and Minerals.**

H. Alban Anderson, of Peekskill, N. Y., has one of the finest collections in the East which was brought together over a period of years. Though his collection embraces thousands of specimens, only his choicest are on display.

Dr. J. R. Evers, of North Tarrytown, N. Y., who has been collecting but two years, has made the greatest strides in mineralogy ever brought to our attention. He has visited hundreds of localities from New Hampshire to Alabama, collected thousands of specimens, purchased specimens extensively, and often works deep into the night cutting and polishing semi-precious stones in which he specializes. His large and spacious mineral museum is filled with choice specimens.

William Lewis Fitts
April 11, 1866—August 6, 1938

William Lewis Fitts, 72, a member of the Rocks and Minerals Association, died at his home, 36 Brown Street, Springfield, Mass., on the morning of August 6, 1938.

He was born in Springfield April 11, 1866, the son of Havelin T. and Eglantine (Aldrich) Fitts. He was a member of the South Congregational Church, the Winthrop Club, and the Rocks and Minerals. Association (since .Oct. 18, 1929).

Mr. Fitts was well known as a mineralogist and had one of the finest collections in Massachusetts. This remarkably fine collection has been left to the Massachusetts State College which institution will have it on display in the near future.

Mr. Fitts leaves a son, William Clark Fitts of Northampton, Mass.; a daughter, Mrs. Della E. Drew of Springfield; and four grandchildren, Clark, Robert, Eleanor, and Florence Fitts.

Newry Miner Killed By Blast

Killed by the force of the premature explosion of dynamite with which he was preparing to blast a rock, Wallace Dickson Nevel, 51 of Andover, Maine, was found dead by his son, Paul, Wednesday forenoon, Sept. 7, 1938, in North Newry where Mr. Nevel had leased and was operating a feldspar mine. He was also the proprietor of the Stone House on the South Paris road. In this shop he sold specimens and cut gems principally from Maine.

The Connecticut Guide

The aim of this bulletin has been to prepare a guidebook of the Baedeker type as an aid to those traveling through Connecticut. To a mineral collector, it will help him find mines, quarries and geological formations. The guidebook tells something of the State's history and contains other items of importance. In the back of the book are classified lists of places of special geological interest; places of special botanical interest; places connected with Indian history; State institutions, parks and forests; books about Connecticut and hotels. 320 pages, 37 sketch maps.

A 30x40 inch map accompanies the guidebook and it is of unusual interest as it bears many symbols showing the location of mines, quarries, geological formation, Indian history, industrial history, historic buildings or sites, scenic places, scenic roads, trails, good views, forts and battlefields, etc. An excellent map easily worth $1.00.

Issued by the State of Connecticut Publicity Commission, State Capitol, Hartford, Conn. Price for Guidebook and Map only 60c.